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Sub a1  
WHAT IS CLAIMED IS:

1. A control system for controlling and monitoring electronically controlled equipment comprising:  
control means including a plurality of programs each having associated local storage memory, each of said programs operable to be executed independently of other of said programs to produce output data;

a database memory having associated memory elements for storing said output data;

a processor for executing each of said programs to produce new output data, said processor operable to transfer data stored in said memory elements to said associated local storage memory for use in execution of said programs and operable to transfer said new output data to said associated elements; and

database managing means for controlling the transfer of the data stored in one of said memory elements to one of said programs, such that the data stored in said one of said memory elements is transferred to said one of said programs only if the data stored in said one of said memory elements has changed since a previous transfer of the data stored in said element.

2. The control system of Claim 1 wherein said memory elements comprise a data portion and a plurality of status bits associated with said programs.

a 3. The control system of Claim 2 wherein said database manager sets said status bits of one of said memory elements <sup>responsive</sup> ~~response~~ to a change in said data portion of said one of said memory elements.

5 4. The control system of Claim 3 wherein said database managing means clears one of said status bits associated with one of said programs in response to said data portion being transferred to said one of said programs.

5 5. The control system of Claim 4 wherein said data managing means transfers said data portion of one of said to one of said programs when said status bit associated with said program is set and does not transfer said data portion to one of said program when said status bit is cleared.

6. The control system of Claim 1 wherein said database memory comprises a plurality of memory blocks, each memory block associated with a particular data type.

7. The control system of Claim 6 wherein each of said memory blocks comprises a plurality of memory elements, the memory elements of ones of said memory blocks being of equal size.

5           8.    The control system of Claim 7 wherein each of said output data has an associated index corresponding to a predetermined element in said database memory, said associated index identifying one of said memory blocks and the relative position of said predetermined element within said memory block.

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9.    The control system of Claim 1 wherein said plurality of programs includes a communications program to operably connect said database memory to said electronically controlled equipment.

10.   The control system of Claim 1 wherein said plurality of programs includes an output program for graphically displaying representations of the data stored in said data elements of said database memory.

58

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11. A method for monitoring and controlling electronically controlled equipment comprising the steps of:

operating a plurality of programs independently of one another to produce output data;

storing said output data in associated memory elements in a first storage memory;

requesting a transfer of data stored in ones of said data elements to a second storage memory associated with one of said programs;

determining which of said data stored in said ones of said data elements have changed since a previous transfer of said data stored in said ones of said data elements;

transferring said data stored in said ones of said data elements which have changed since said previous transfer; and

executing said one of said programs to produce new output data.

12. The method of Claim 11 and further comprising reading status bits associated with said ones of said data elements and with said one of said programs, wherein said status bits indicate a change in said data element.

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13. The method of Claim 12 and further comprising changing said status bits in response to said new output data to indicate that the data stored in memory elements associated with said new output data has changed.

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14. The method of Claim 12 and further comprising changing said status bits after transferring said data stored in <sup>to an associated program</sup> ones of said data elements to indicate that said data has been transferred.

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15. The control system of Claim 11 wherein said ~~output~~ data has an associated index number and further comprising determining the address of said associated memory element by performing a mathematical <sup>address</sup> computation on said index number.

62

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16. A control system for controlling and monitoring electronically controlled equipment comprising:

control means comprising a plurality of programs and associated local storage memory, each of said programs operable to be executed independently of other of said programs to produce output data having associated index numbers and data types;

a database memory for storing said output data in memory elements corresponding to said index numbers and said data types associated with said output data;

status bits associated with each memory element, such that each memory element has an associated status bit for each of said programs;

a processor for executing each of said programs to produce new output data;

database managing means for controlling the transfer of data between said database memory and said local storage memory, said database managing means adjusting the value of ones of said status bits upon storing new data in the data element associated with said ones of said status bits or upon transferring data to one of said programs associated with ones of said status bits; and

said database manager operable to transfer data from one of said data elements to said local memory of one of said programs only when the status bit associated with both said one of said data elements and with said one of

said programs indicates that the data in said one of said data elements has changed since a previous transfer.